

## IN THE CLAIMS

Please amend the claims as follows:

1. (currently amended) An improved CZ system for growing a single crystal ingot from a molten crystalline material comprising:  
 a fixed low aspect ratio, wide diameter crucible including a base and side walls for holding a quantity of molten material at a melt / crystal interface with respect to a seed crystal for growing an ingot from the molten material;  
 a pre melter for providing a substantially continuous source of molten material to the crucible, such that the melt / crystal interface is maintained at a desired level without vertical travel of the crucible;

annular heating means comprising separately controllable heater elements disposed provided adjacent to the base of the crucible at a fixed distance therefrom, each heating element for transferring a desired amount of thermal energy to an adjacent portion of the crucible for providing an optimal a controllable thermal distribution across the melt crucible and at the crystal / melt interface for optimal crystal growth.

2. (currently amended) An improved CZ system as in claim 1 wherein the annular heating means comprise a plurality of separately controlled resistive heaters disposed in a radial pattern to establish corresponding thermal zones ~~across the melt~~, each thermal zone controlled by thermal output of a respective resistive heater such that an optimal thermal distribution is established ~~across the melt and at the crystal melt interface~~ the crucible.

11. (currently amended) An improved CZ system for growing a single crystal ingot from a molten crystalline material comprising:  
 a fixed low aspect ratio, wide diameter crucible for holding a quantity of molten material at a melt / crystal interface with respect to a seed crystal for growing an ingot from the molten material without vertical travel of the crucible;  
 a pre melter for receiving a source of solid crystalline material and dopant material and providing a continuous source of molten doped material to the crucible;  
 individually controllable heating means disposed around the sides and adjacent to the base of the

crucible at a fixed distance therefrom for providing corresponding controllable heating zones an optimal thermal distribution across the melt crucible and at the crystal / melt interface for improved crystal growth.

Please cancel claims 12-13.

14. (currently amended) An improved CZ system for growing an ingot from a seed crystal positioned at a growth interface in a crucible including a pre melter for melting solid crystalline feedstock received from a source and for providing an output of molten material to the crucible, comprising;  
a load cell means mechanically coupled with the crucible for sensing the weight of the melt in the crucible and for producing output signals representative of the sensed weight;  
a level controller comprising a microprocessor responsive to signals from the load cell and for determining output of the pre melter based on a desired depth D of melt in the growth crucible;  
a flow control means, communicatively linked with the level controller and disposed between the source of solid feedstock and the pre melter for truncating or dispensing feedstock from the source to the pre melter in response to a signal from the level controller such that the output of the pre melter maintains the level of melt in the crucible at a predetermined depth for optimal crystal growth.

Please cancel claims 15-17.

Please cancel claims 21-26.

27. (currently amended ) An apparatus for substantially uniform melting of crystalline feedstock including solid granules characterized by a diameter on the order of 1 mm or less in a crucible comprising:  
a fixed low aspect ratio, wide diameter crucible for holding the molten crystalline feedstock without vertical travel;  
a plurality of independently controllable heaters provided beneath the base of the crucible at a fixed distance therefrom, such that a maximized surface area of contact and minimized thermal path exists between the granules and the independently controllable heaters beneath the low aspect ratio crucible; and  
means for applying power to thermally activate each heater to achieve an optimal temperature distribution such that the thermal zones drive heat uniformly into the granules at a desired rate.

30. (currently amended) An apparatus for substantially uniform melting of silicon or polysilicon crystalline material including solid granules down to a diameter on the order of 1 mm or less in a crucible comprising:

a fixed, low aspect ratio, wide diameter crucible for holding the silicon or polysilicon melt without vertical travel;

a plurality of independently controllable heaters disposed beneath the crucible at a fixed distance therefrom for establishing corresponding thermal zones through the melt, such that a maximized surface area of contact and minimized thermal path exists between granules in the melt and the independently controllable heaters beneath the low aspect ratio crucible;

means for thermally activating each heater to achieve an optimal thermal distribution across the melt such that granules are melted uniformly at a desired rate; and

control means for selectively controlling thermal activation of each heater by monitoring power consumed by each heater to achieve the optimal thermal distribution across the melt.

32. (currently amended) An improved CZ system for growing one or more single crystal silicon ingots from a molten silicon material comprising:

a fixed low aspect ratio, wide diameter crucible including a base and side walls for holding a quantity of molten silicon at a melt / crystal interface with respect to a seed crystal for growing the ingot from the molten material;

a pre melter for providing a continuous source of molten silicon feedstock to the crucible, such that the melt / crystal interface is maintained at a desired level without vertical travel of the crucible;

a plurality of growth chambers rotatably disposed with respect to the crucible for pulling the seed crystal to form an ingot, such that the same crucible is recharged by the pre melter for each growth chamber;

annular heating means disposed beneath the base of the crucible at a fixed distance therefrom for providing a uniform thermal distribution across the ~~melt~~ crucible and at the crystal / melt interface for optimal crystal growth.

33. (currently amended) An improved CZ system as in claim ~~34~~ 32 wherein the annular heating means comprise a plurality of separately controlled resistive heaters disposed in a radial pattern to establish corresponding thermal zones across the ~~melt~~ crucible, each thermal zone controlled by thermal output of a respective resistive heater such that an optimal thermal distribution is established across the ~~melt~~ crucible and at the crystal / melt interface.

Please cancel claim 34.

Please add the following new claim.

35. (newly presented) An improved CZ system as in claim 32 wherein the fixed distance from the crucible is in a range of  $\frac{1}{4}$  inch to about 12 inches and preferably from  $\frac{1}{4}$  inch to about 3 inches.